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Neutral Excitations in the Gaffnian state BYUNGMIN KANG, JOEL E. MOORE, UC Berkeley — The Fractional Quantum Hall Effect (FQHE) is one of the most well-studied systems having topological order. Starting with the pioneering work by Laughlin, the model wave function approach has been shown to provide essential information for understanding topological order in gapped incompressible states. We study a model wave function called the Gaffnian state which is believed to represent a gapless, strongly correlated state that is very different from conventional metals. To understand this exotic gapless state better, we provide a representation in which the pairing structure of the Gaffnian state becomes more explicit. We employ the single-mode approximation of the Girvin-MacDonald-Platzman (GMP) mode, which is a neutral collective exitation mode, in order to have a physical picture of the gaplessness of the Gaffnian state. In particular, we discuss how to extract systematically the relevant physics in the long-distance, large electron number limit of the FQH states using a numerical calculation with relatively few electrons.

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